



HPD L15A7

Engine Installation Manual

DB-1 and DB-6 Chassis



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Safety Precautions

The service information in this manual is intended for use by qualified, professional technicians. Attempting service or repairs without the proper training, tools and equipment could cause injury or death to you and others. It could also cause damage to the engine / vehicle or create an unsafe condition.

This manual describes the proper methods and procedures for the race kit installation related to your chassis, in addition to service and repair procedures described in the Honda Fit service manual. Some procedures require the use of specifically designed tools and dedicated equipment. Any person who intends to use a replacement part, a service procedure, or a tool that is not recommended by Honda or the race sanctioning body, must determine the risk to their personal safety, and the safe operation of the vehicle. Any error or oversight while performing this conversion or service can result in faulty operation, damage to the vehicle, or injury to yourself, or others.

Proper service and maintenance are essential to the racer's safety and the reliability of the race car. If you need to replace any parts, always use the correct parts supplied by Honda Performance Development or American Honda Motor Co., Inc. Do not use inferior quality or unapproved parts.

Because this manual is intended for professional technicians, we do not provide warnings for basic shop safety practices – for example, hot parts = wear gloves. If you have not received shop safety training or do not feel confident about your knowledge about safe servicing practices, we recommend that you do not attempt the procedures described in this manual. We cannot warn you of every conceivable hazard that can arise in doing service and repair procedures. Only you can decide whether or not you should do a given task.

⚠ WARNING

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Carefully follow the procedures and precautions in this manual and other service material.

⚠ WARNING

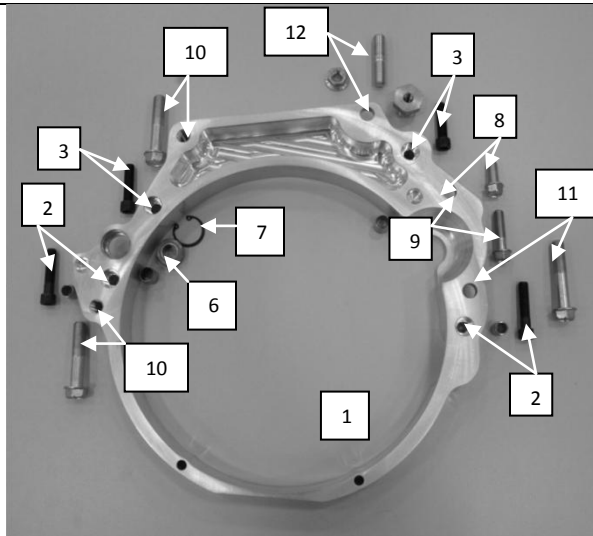
Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Carefully follow the procedures and precautions in this manual.

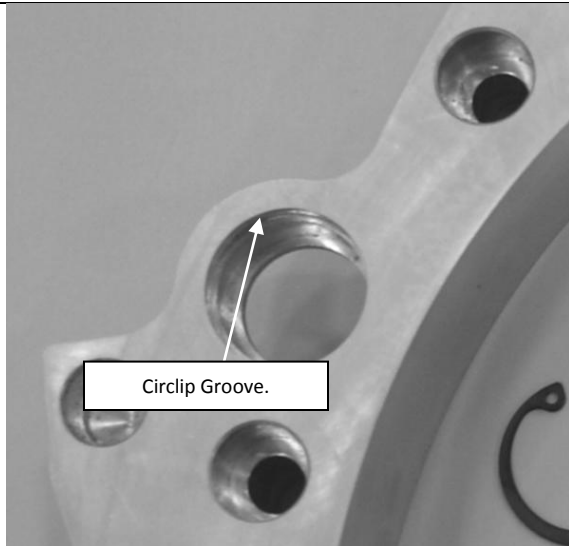
This manual details the steps necessary to install the Honda L15A7 engine with the HPD engine kit into a Swift DB-1 / DB-6 chassis. The converted L15A7 engine is designed to be installed utilizing the existing mounting points of your chassis without modification.

For the purpose of this manual, all photos are of a DB-1 chassis. Specific parts and procedures unique to the DB-6 are explained when necessary.

Bell Housing Adapter Preparation



1. Adaptor plate.
2. Internal hex bolt 3/8-24 x 1-3/4" (2x)
3. Internal hex bolt 3/8-24 x 1-1/2" (2x)
4. Dowel - 12 x 10mm (2x)
5. Dowel - 14 x 20mm (2x)
6. Spherical Bearing (DB-1)
7. Circlip, Internal - 1.06" (DB-1)
8. Flange Bolt - 10 x 25mm
9. Flange Bolt - 10 x 40mm
10. Flange Bolt - 12 x 60mm (2x)
11. Flange Bolt - 12 x 65mm
12. 12 x 28mm stud



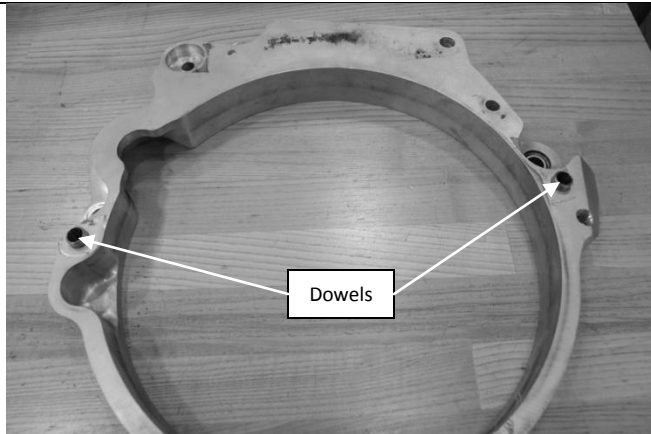
Polish the circlip groove to remove the sharp edge.



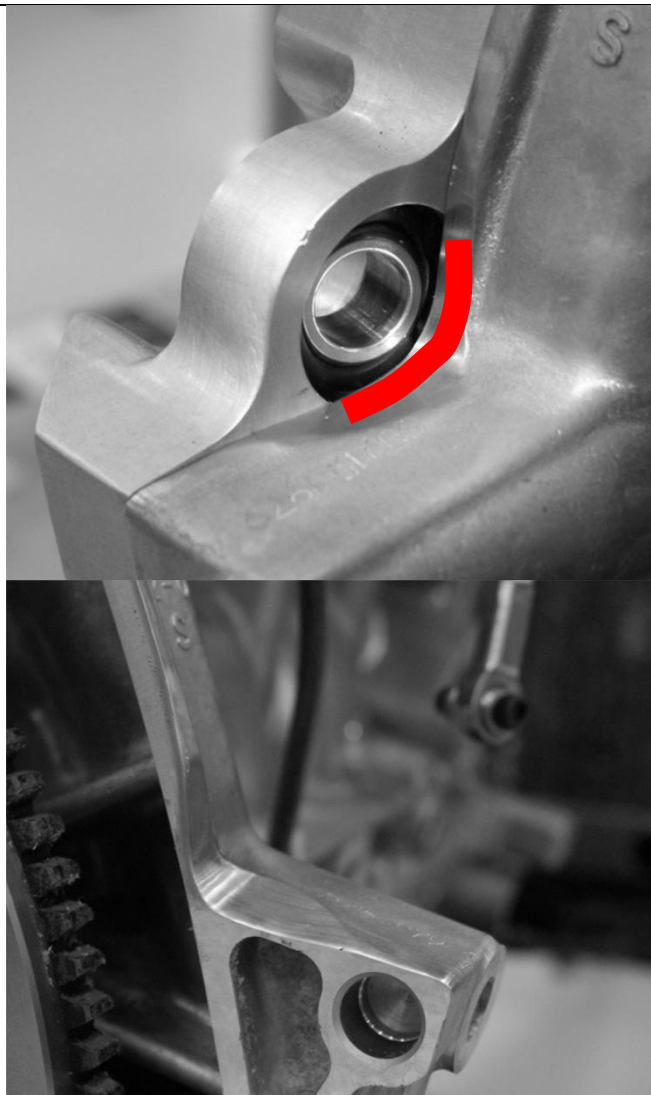
Heat the adapter plate.

Install the spherical bearing. A light to moderate press is normal.

Install the internal circlip.

Bell Housing Adapter Preparation cont'd

Install the locating dowels.



Mock up the adapter plate to the engine.

Note the area where the shifter rod passes through. This area will need to be tapered towards the bearing. Mark the area of the engine block for material removal. Remove only enough material to allow the rod to move freely, leaving enough material to maintain a mating surface.

Install Slave Cylinder



For the DB-1

Install the HPD supplied slave cylinder using the same procedure used for the Swift slave cylinder.

NOTE: Use new seals and backing rings.



Install a new release bearing onto the slave cylinder.



Install the HPD chassis kit input shaft using the same procedure as the Swift unit.

Refer to the appropriate manual for your type of gearbox for proper installation.

It is suggested that the input shaft seals be upgraded / replaced at this time.

Install Slave Cylinder cont'd**For the DB-6**

Remove the release bearing from the Swift assembly.

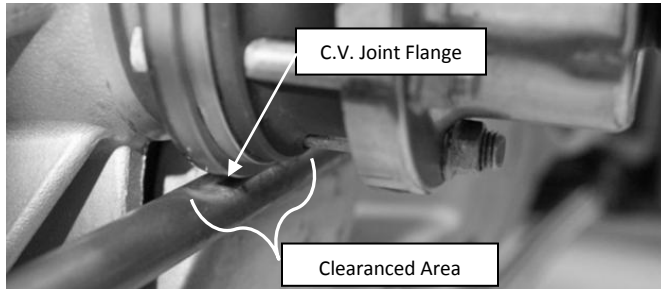
Press on the HPD supplied adapter.

Install the new release bearing.

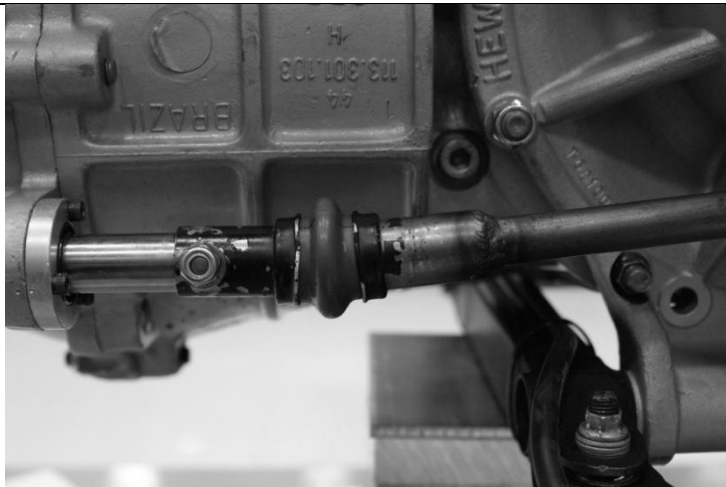
Clutch Slave Cylinder Placement

1. Measure distance from the back of the engine block to the end of the clutch fingers. This is dimension "A"
2. Place a straight edge across the front of the bell housing and measure from the straight edge to the mounting surface of the slave cylinder. This is dimension "B".
3. With the slave cylinder compressed into the bore, measure the installed height of the slave cylinder. Add 4.0mm to this dimension for freeplay. This will be dimension "C".
4. Use the following equation to determine the proper slave cylinder spacer length. $B - C - A = XX$
Spacer Length.

Modify Shifter Rod DB-1 Only



The middle shifter rod will need to be modified to clear the C.V. joint flange. HPD has supplied the rod for the rear shifter link.



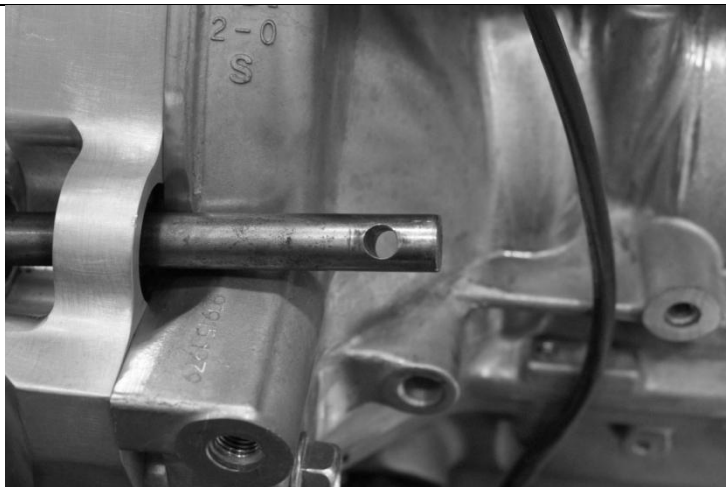
The middle Apex joint will need to be moved forward by 4 inches.

Cut the Apex joint from the rear shifter rod, and the rear Apex joint of the middle shifter rod. Weld one joint onto the new rear rod (gearbox side).

Lay your, and HPD's, rod next to each other and measure the difference in length (approximately 4 inches). This will be the amount to remove from the middle rod.

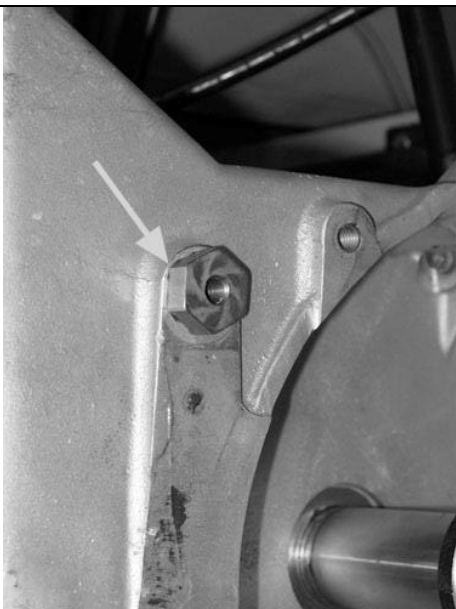
Cut the middle rod.

Weld the second Apex joint onto the middle rod.



Drill the bolt hole, being careful to line up the linkage properly.

NOTE: It is suggested to wait until the engine and gearbox are properly installed before drilling the bolt hole. This will better ensure that the linkage is clocked properly.

Bell Housing / Oil Tank Preparation – DB-1 & DB-6

Using Hondalock 2, or its equivalent, install the AN -10 plug in the upper left oil return port. This is now an engine mounting point.



Install oil tank cover using existing bolts and an RTV-type sealant.

Install Fuel System – DB-1 & DB-6

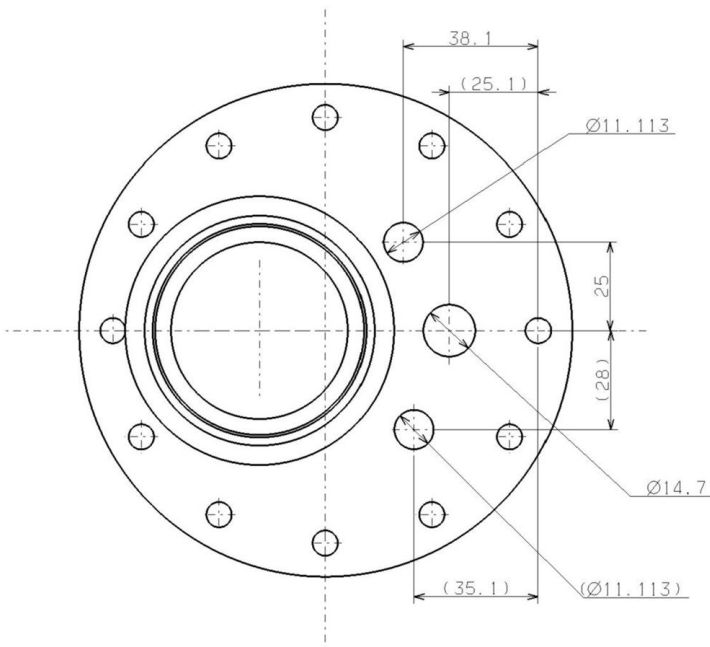


The Fit Fuel system consists of the fuel pump, fuel filter, regulator, assorted fittings and hoses. If you are using your own hose supply, ensure that it is rated for high pressure fuel injection systems. The HPD-kitted fuel system runs at 50-60 PSI. The feed hose needs to be rated at a minimum of 150 psi.



Remove the regulator from the kit.

Discard the ring, the small O-ring and the small clip.



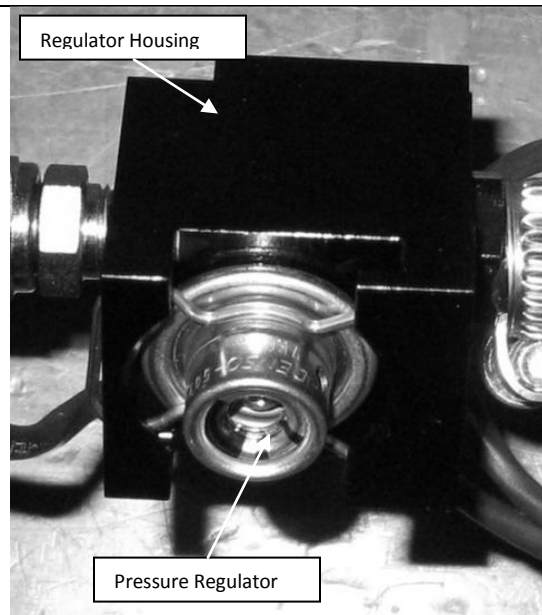
Modify the fuel cell cover by using the drawing provided to add a third outlet. This will become the fuel out.

The AN-6 center hole (previously the fuel out) will be for fuel pump harness.

The right side AN-4 will become the fuel cell vent.

The left side AN-4 is the main fuel feed out.

Install Fuel System – DB-1 & DB-6 cont'd

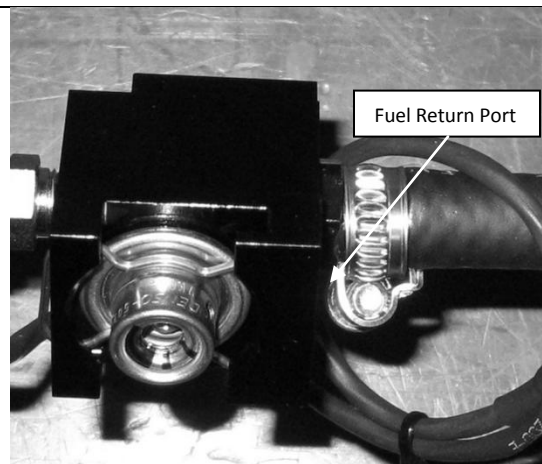


Install the regulator into the housing using a light oil or silicone lubricant on the O-rings.

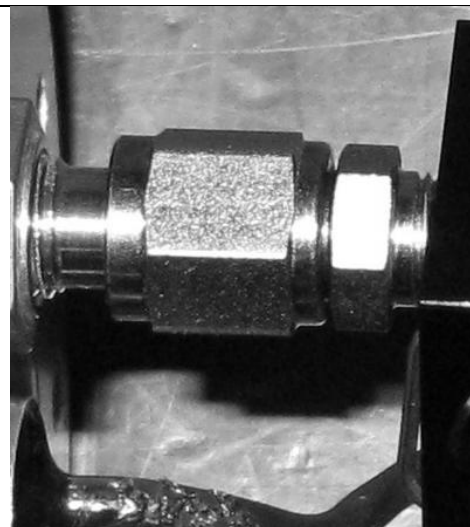
Make sure to insert the regulator square, as it will be easy to cut the O-rings.

It will take some force by hand to install the regulator.

Install the clip in the housing.



Position the housing so the return fuel port faces toward the bottom of the fuel cell.



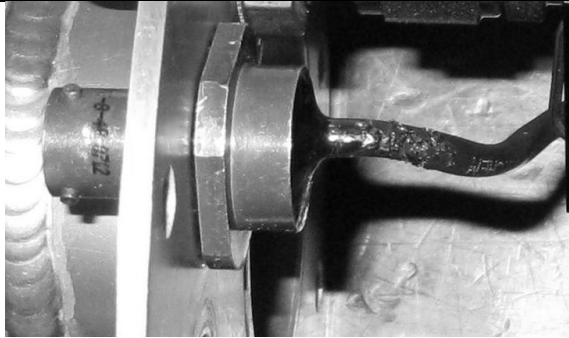
Using a pipe thread sealant, install the AN-4 to 1/8 NPT adaptor into the housing, on the cover (top) side. This will connect to the AN-4 bulkhead feed fitting.

Install Fuel System – DB-1 & DB-6 cont'd



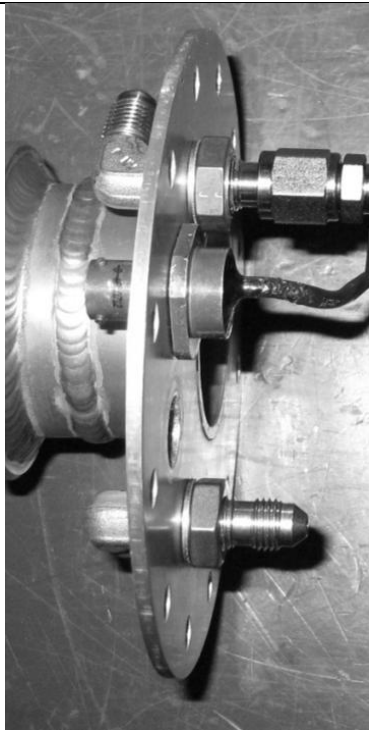
Using the pipe thread sealant, install the 5/16" Barb to AN-4 ORB adaptor into the housing, on the fuel cell (bottom) side. This will connect to the fuel pump.

NOTE: Be sure the regulator is sending excess fuel back into the tank (down) and not into the cover (up).



Install the fuel pump harness into the AN-6 hole. Ensure the O-ring is in place.

Snug down the connector.



Loosely install both 90° AN-4 bulkhead fittings in to their respective positions.

Use the AN-4 crush washers between the flange and the jam nuts.

Install Fuel System – DB-1 & DB-6 cont'd

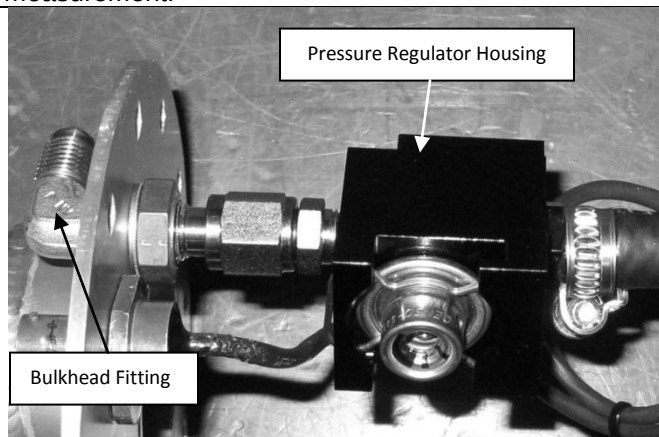
Find the depth of your fuel cell.

Depending on your fuel cell configuration, you may need to remove the two middle sections of fuel cell foam.

From the top of the cover retainer ring, measure to the bottom of the cell.

Subtract 1/8" – 1/4" from your measurement. This number is the target length for your fuel pump location. Ensure the fuel pump does not rest on the bottom of the fuel cell.

NOTE: Be sure the cell is not collapsed; you may have to lift up on the retainer ring for an accurate measurement.

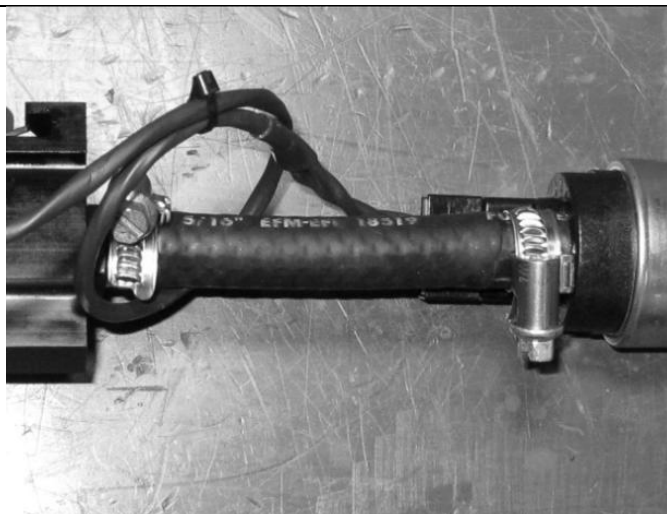


Calculate the length of the connector hose.

Install the pressure regulator housing assembly onto the bulkhead fitting in the cover. Snug the fitting. Measure from the bottom of the cover to the bottom of the hose nipple on the housing, record this number.

Measure the length of the fuel pump from the bottom of the hose nipple to the bottom of the pick up screen - record this number.

Add these two numbers together and subtract from the overall fuel cell depth measurement. The final number will be the length of the connector hose.



Install the hose with the clamps.

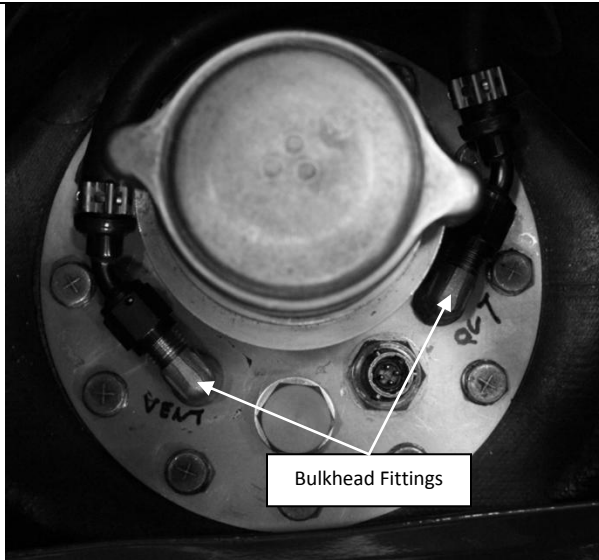
Install Fuel System – DB-1 & DB-6 cont'd



Clock the fuel pump pick up towards the rear of the cell.

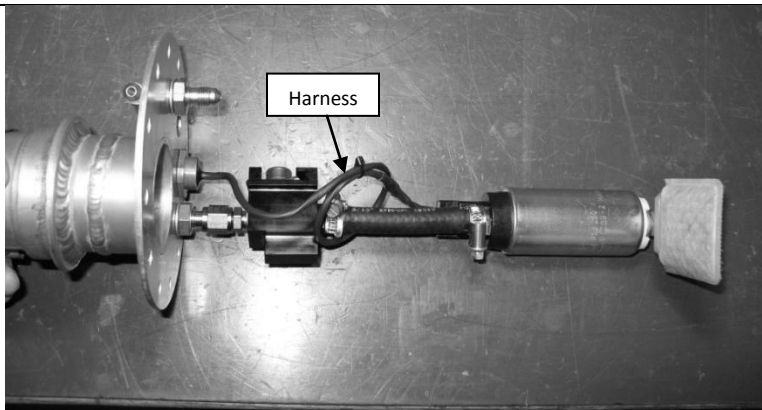
Clock the regulator housing so fuel is returned over the pickup.

Tighten all of the connections.



Clock the bulkhead fitting correctly on the top of the fuel cell cover, so access to the retainer bolts is possible and supply and vent hoses are not overly twisted.

Connect the fuel pump harness to the pump.



Pigtail the harness around the hose being careful that the harness does not chafe on the regulator housing.

You will need to cut out some of the fuel cell foam from the left side piece.

Only remove enough to be able to install the cover/pump assembly easily.

Install the assembly.

Install Fuel System – DB-1 & DB-6 cont'd**Fuel hose routing**

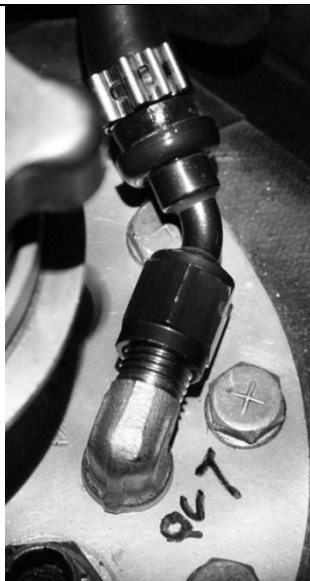
There are 4 cushion clamps supplied with the kit to mount the fuel filter.

Using the adaptors and reducers connect the fuel test port to the 'out' side of the fuel filter.

Mount this assembly using the cushion clamps about 4-5 inches from the mid bulkhead (this is only a suggested location).



Install the 45° push-loc fittings onto the supplied hose.



Install the fuel feed line onto the fuel cell cover and route the same as the original. This will connect to the fuel filter with another 45° degree push-loc.

Cut the hose to length and install.

Install Fuel System – DB-1 & DB-6 cont'd

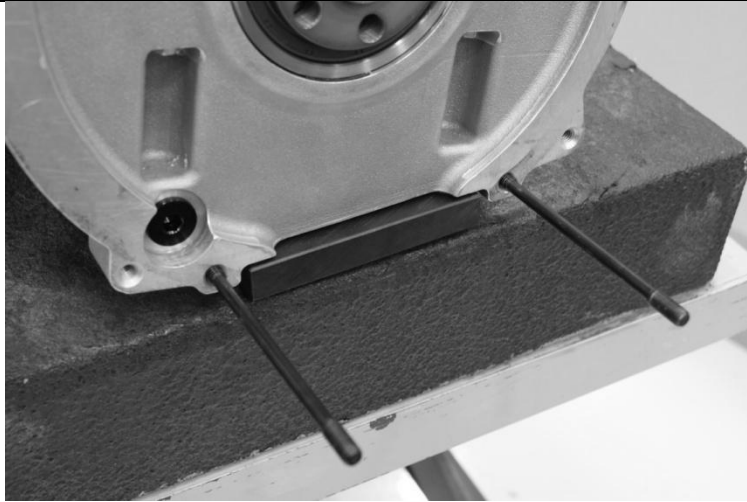


Install the third 45° push-loc onto the supplied hose.

Connect this to the 'vent' fitting on the fuel cell cover, route it the same as the fuel feed line.

NOTE: You will need to supply your own vent check valve.

Route the hose as normal.

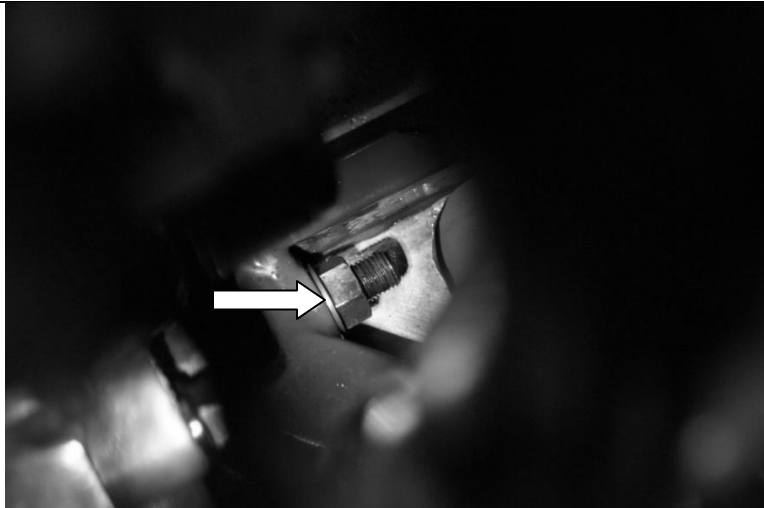
Engine Installation

Install the lower rear mounting studs.

This engine will install in the same manner as your previous engine.

Be sure the water lines are installed on the engine per the engine race kit manual.

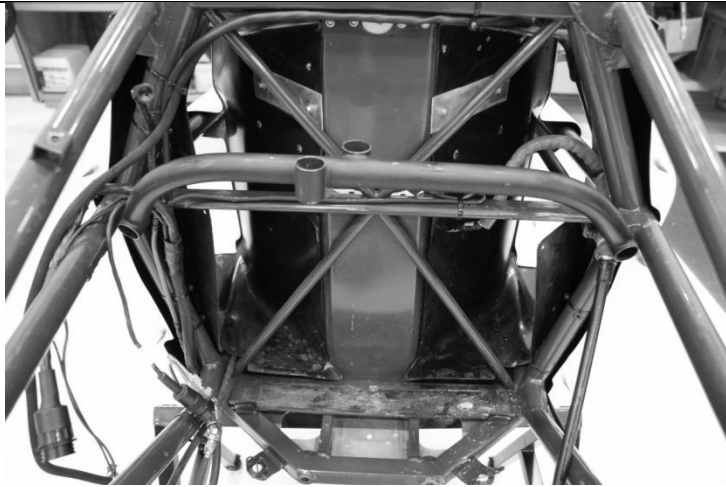
Install the gearbox adaptor with the supplied dowels and socket head bolts to the bell housing.



The spacers in the chassis for the lower front mounting studs need to be a minimum length of 30mm, to prevent the flange nut from bottoming on the shank of the stud. (1.18").

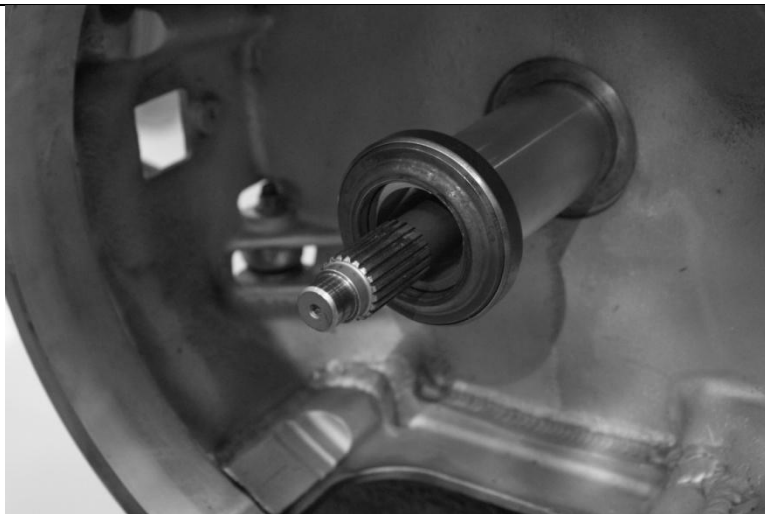
Four 3mm thick washers are included in the kit to help adjust this dimension. If needed, they are to be placed between the flange nut and frame member, indicated by the arrow.

Engine Installation cont'd



Loosely install the upper front mount. Be sure the top hat is in the flange on the head from the bottom.
(From Engine Kit Installation Manual – Pg 17).

Slide the engine into position; thread the nuts onto the front studs. Loosely install the upper mount bolts into the head.



Apply a small amount of anti-seize to the splines of the input shaft.

Ensure the lower rear mount studs are in position and not binding.

Introduce the bell housing assembly onto the engine.

Engine Installation cont'd

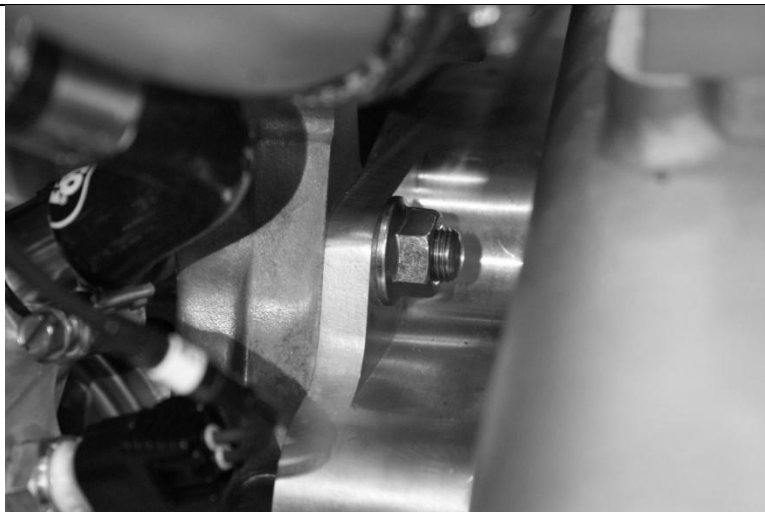
Align the input shaft splines with the clutch and mate the bell housing to the engine.

When you have the dowels engaged, you can thread in the four bolts and snug up the bell housing.



Where the bell housing and the adaptor meet on the underside, it may be necessary to install shims before tightening the bottom studs.

Shims are included in the kit (0.01mm and 0.02mm thickness).



Install the main chassis bolts into the bell housing. Install the 10mm flange nut onto the engine stud.

Check the shim dimension on the bottom of the engine/adaptor plate. Install the k-nuts onto the studs and tighten.

Tighten all studs and bolts.

Oil System



Layout all the hose and fittings before assembly to understand how the hoses are to be placed.

NOTE: If you are cutting the braided hose to length and installing the fittings yourself be sure you are familiar with the proper procedures. If not done correctly you could cause damage or harm to yourself or others.



The oil feed for both chassis is on the lower right side of the oil pan. This is an AN-10 fitting.

There is an in line filter included in the kit. This should be incorporated into the oil feed line. Be sure it is installed in the correct direction.



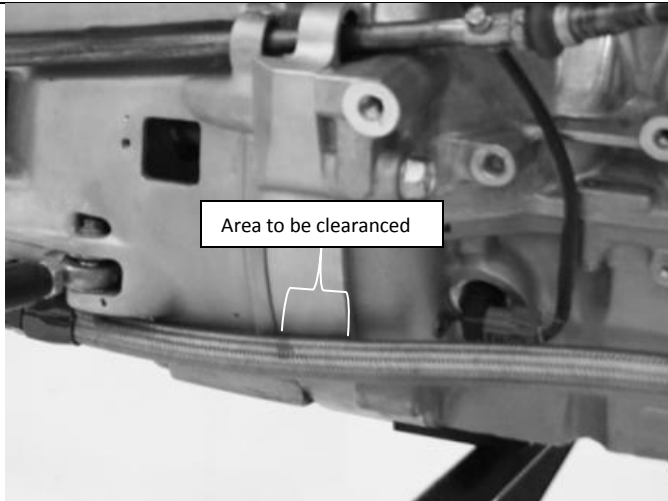
The oil return line is a AN-12 at the bottom of the scavenge pump.

Route the return line up between the engine and bell housing.

Oil System cont'd

Route the breather lines, being sure to check the following items:

1. That the 2mm breather restrictor is in the valve cover.
2. That the valve cover breather is not interfering with the operation of the rear anti roll bar.
3. That the DB-1 kit has AN-8 hose end fittings and adaptor fittings for the breather lines.
4. That the DB-6 kit has push loc fittings for all breather lines.



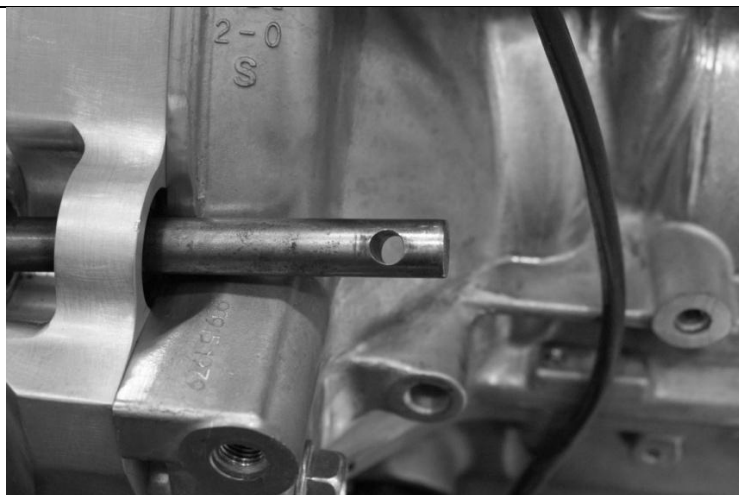
DB-6 owners may need to grind the indicated area on the bell housing adapter to prevent chafing of the oil feed line.

Install Modified Shifter Rod

Install the HPD supplied rear shifter rod.



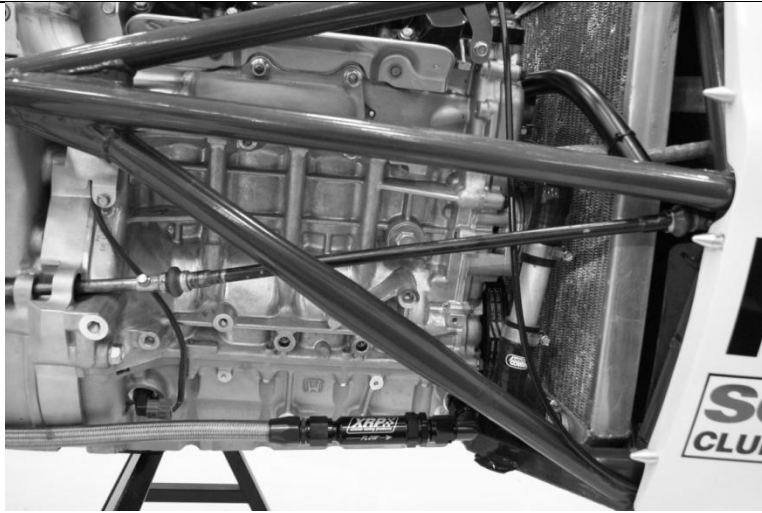
Install the bolt to the shaft and selector fork at the gearbox.



Line up the shifter lever in the cockpit and mark through the middle Apex joint to place the new bolt hole.

Remove the shaft and drill new bolt hole.

Install Modified Shifter Rod cont'd



Install the middle shifter rod; tighten all bolts securing the shifter rod and check that you can select all the gears.

Make fine adjustments at the lever-end in the cockpit if necessary.

Miscellaneous



Install the throttle cable.

Use the method described in the Race Engine Assembly manual (pg 48) to set full throttle.

Performance Tip:

Be sure your throttle pedal stop is strong enough to withstand the force of your foot.

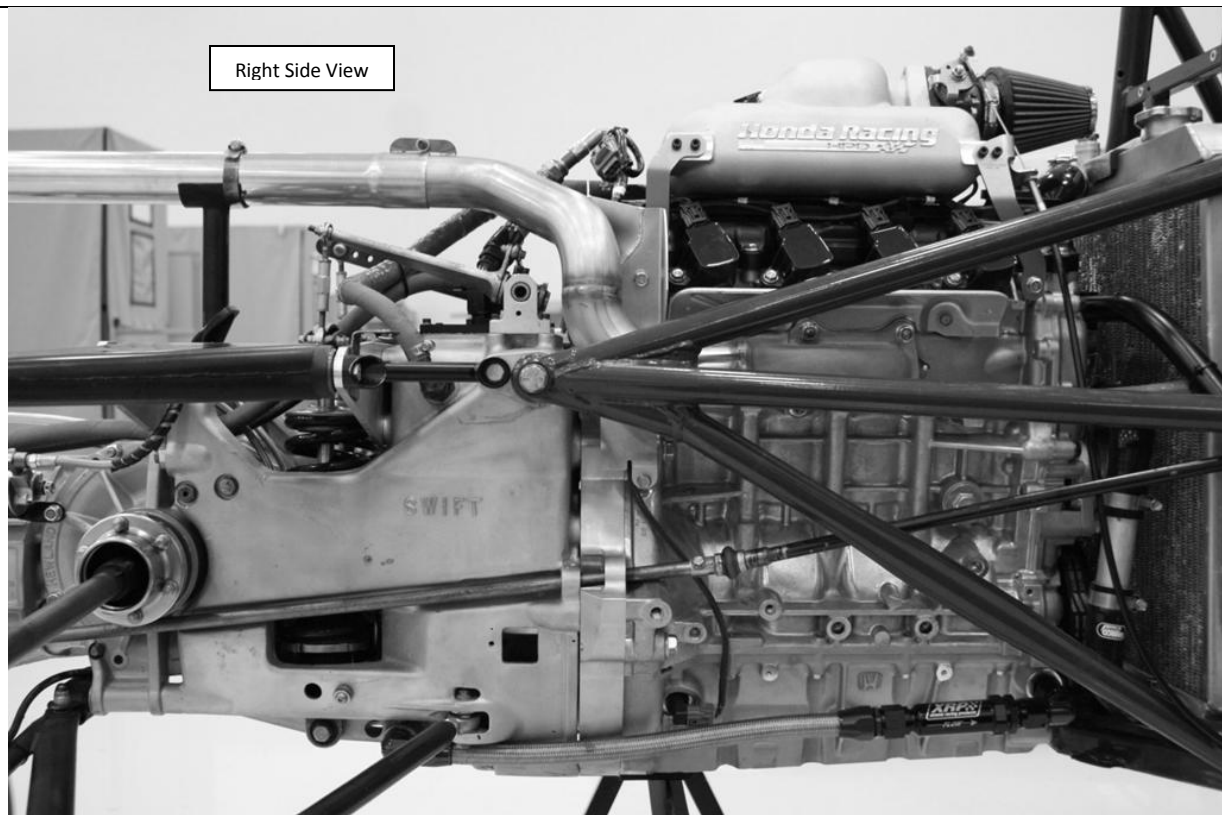
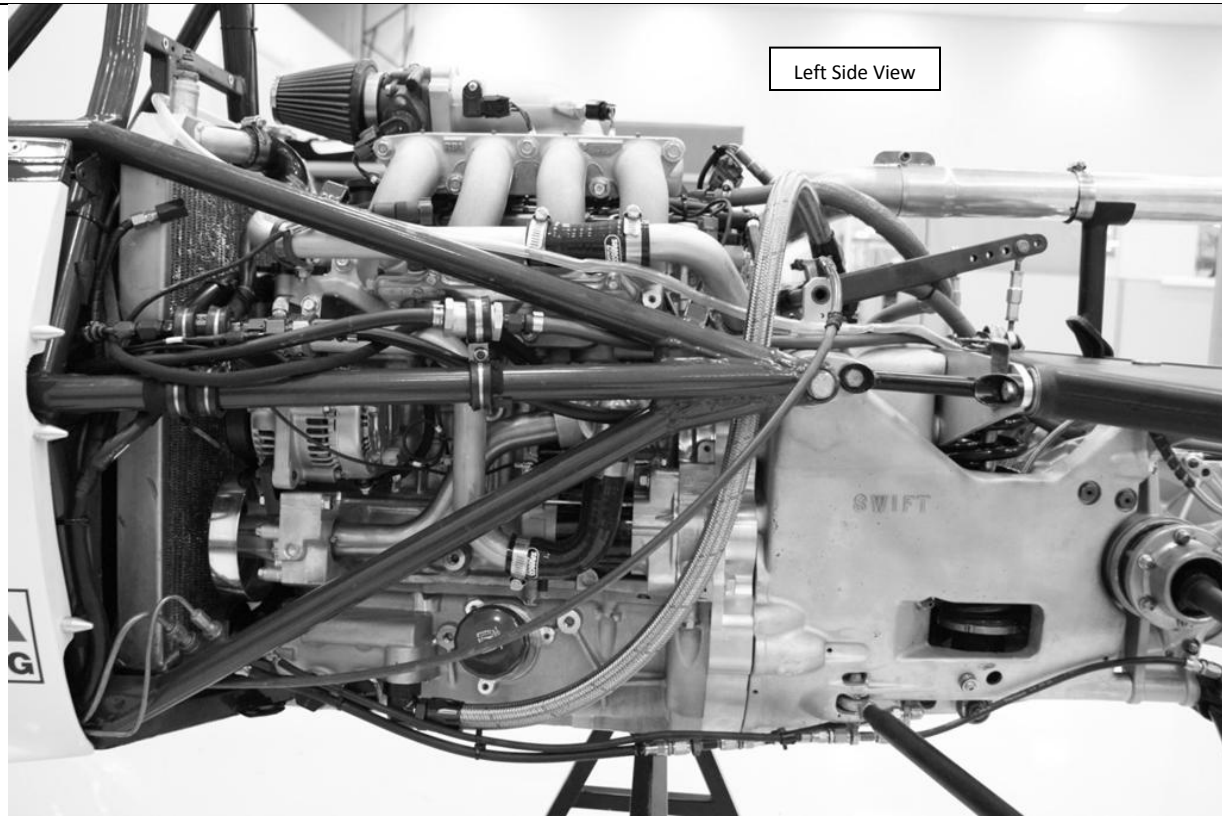
The pedal should not be able to rock side-to-side on its pivot point, as this will lead to premature cable wear and inconsistent full throttle applications.

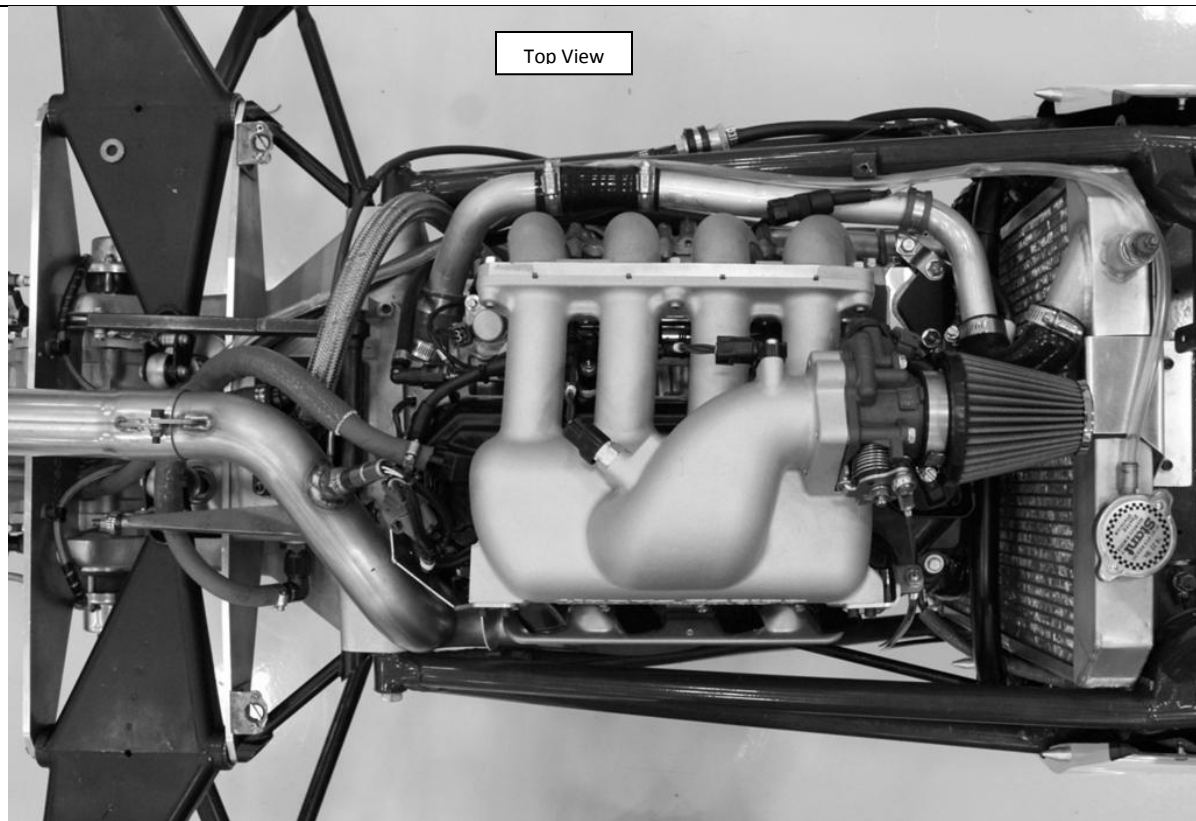


Install the exhaust system. Depending on your previous system you will need to adjust the height of the tail pipe support.

Install the Lambda sensor per the Honda Fit service manual. Plug into the engine harness.

Completed Install



Completed Install cont'd**Installing fluids:**

The oil system will hold the same volume as your previous engine did.

The coolant bleed procedure is the same as your previous engine.

We recommend you prime the oil and fuel systems before starting your L15A7 engine for the first time.

See 'Operating Parameters' section of your L15A7 Engine Kit Assembly Manual.

NOTE: HPD recommends installing a 19-20psi radiator cap.

Follow the Honda Fit Service manual guidelines for all fluid recommendations.

Connect the brake and clutch lines. Bleed the systems as normal.

Engine Side Cover Blister Installation

By Stan Clayton
Dauntless Racing Cars, February 2010

Safety Precautions

Personnel undertaking this procedure should read and understand all relevant MSDS documents before using resins, hardeners, catalysts and solvents, as they can be hazardous to one's health. Use appropriate safety equipment at all times while working with these materials, with a minimum of long sleeves, protective gloves, respirator and eye protection.

This set of instructions presumes the reader is familiar with basic composites work. Read and understand all steps of this procedure before starting it. If you doubt that you can correctly complete the task, do not hesitate to have an experienced composites shop complete it for you.

Warning

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Follow the procedures and precautions in this manual and other service materials carefully.

Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Follow the procedures and precautions in this manual carefully.

Engine Side Cover Blister Installation cont'd

1. The blisters are made approximately one inch oversize to give the installer maximum flexibility to match the body lines of the engine side covers. Feel free to trim the pieces during installation to best match your car's side cover body lines. A pneumatic cut-off tool with a 3" x 3/64" narrow kerf metal cutting wheel works well to make the holes, as well as to trim the blisters. A sanding block, dremel or die grinder is also handy for making fine adjustments during fitting.
2. Before attempting to match the blister to each side cover, fit the side cover to the chassis with the Honda Fit engine fully installed and mark the inside of the side cover where the obstruction strikes it. Remove the side cover from the chassis and carefully cut away a minimum of material to clear the obstruction. Several fittings may be needed to cut away just enough. Once the hole is large enough to clear the obstruction, ensure the side cover can be fully installed and uninstalled without the side cover hitting the obstruction. Measure and record how much clearance is needed on either side to clear the obstruction.
3. With the trimmed side cover installed on the chassis, place the appropriate blister over the opening and slide it around on the side cover to best match the side cover body lines, as well as clear the obstruction. The flanges are left over sized, so the installer may need to trim them to ensure a good fit. If trimming is needed, go slowly and trim just a little at a time to prevent trimming too much from the blister. Once the blister is trimmed to best match the body lines, trace the outline of the trimmed blister on the side cover and set the blister aside.
4. Remove the side cover from the chassis and carefully cut slightly inside the marked outline of the trimmed blister with the cut-off wheel. Work slowly to ensure you don't remove too much material. When the hole is roughly cut out inside the line a pneumatic die grinder with a porting stone or flap wheel works well for final trimming. Or use sand paper held in the hand. Do not use a disc as it can easily remove too much material. Once satisfied that trimming is complete and that there is a close fit between the side cover and the blister, set the blister aside and invert the side cover so that the inner surface (the surface facing the engine) is facing upwards, and support the side cover on a work bench.
5. Trace a line around the opening approximately 2" outside the trimmed edge of the hole. Scrub the area with acetone to remove all traces of dirt, grease and oil. It is critical to a successful installation that all traces of dirt, oil and grease be removed from this area, or the new resin will not properly adhere. Next, using a sanding block with medium grit paper or a die grinder and flap wheel, abrade the surface inside the 2" line down to raw resin and/or glass. Remove just enough material to get clean resin/glass. Don't grind through to the surface! Once the sanding is complete, vacuum the area to remove the dust. Lightly abrade the inner face of the blister to ensure a fresh bonding surface.
6. Place the trimmed blister on the fiberglass cloth you will use to make the bonding patch. Trace a line approximately 1.5" outside the blister's outline and cut the fabric to match the line, then cut out a matching outline approximately 1.5" inside the outline of the blister. You will now have a roughly donut shaped piece of fiberglass cloth approximately 3" wide. Repeat the process to produce two more donuts, approximately 2" wide and 1.5" wide. All three layers can be the full width, but narrower strips will save a little weight. Three layers should do the job, but you may add additional layers if you wish, so long as they do not conflict with the chassis tubes or engine installation. Alternatively, if there is internal clearance, you may wish to use 3 solid patches covering out to approximately 1.5" outside the blister outline. Cutting out the inside of the patches (the "donut hole") is not critical...it just saves a little weight.

Engine Side Cover Blister Installation cont'd

7. It is now time to fit the blister to the side cover and tape the outside with 2" masking tape. Ensure the entire outside outline of the opening is covered with masking tape, or resin may leak out onto the outer surface of the side cover. You may also wish to tape the blister in place with additional pieces of tape running fore and aft and up and down on the outside of the side cover.
8. With the blister securely taped in place (tape ONLY on the OUTSIDE surface!), place the side cover inner surface up on a soft mount that will support the side cover without distorting it. You are now ready to bond the blister in place.
9. Ensure the resin and hardener/catalyst and side cover are at or above the minimum working temperature of the resin. Wear all appropriate safety gear and measure out the resin and hardener. The blisters are made with epoxy resin, but satisfactory patches can be had with vinylester or polyester resins, as well. Resin dye may be added to match the color of the patch to the color of the side cover resin. Resin dyes suitable for all resin types may be purchased at: Tap Plastics: <http://www.tapplastics.com/shop/product.php?pid=50&>
10. Once again clean the sanded inner surfaces of the side cover and blister with acetone on a paper towel and let it dry while mixing the resin and hardener thoroughly. When the acetone is evaporated and the resin and hardener are thoroughly mixed, brush a light layer of resin over the sanded and cleaned surfaces, allowing the resin to fill the gap between the side cover and the blister. Place the widest patching layer carefully in place, distributing it evenly inside and outside the outline of the blister. Using the brush, gently wet it out with resin and work out any air bubbles or creases in the fabric so it lies flat to the surface. When the widest layer is wetted out, carefully place the next smaller layer on top of it and wet that layer out. Alternatively, you may start with the narrowest layer; it is not critical. Repeat until all layers are in place and wetted out. Allow to fully cure before proceeding.
11. Once the resin is fully cured (appropriately 24 hours for epoxy, or 12 hours for vinylester or polyester), carefully remove the masking tape. Using a small sanding block and medium grit paper, or a dremel or die grinder with a small stone, carefully sand down any resin bubbles that are standing proud of the outer surface of the side cover.
12. If there are any unsightly transitions between the outer surface of the side cover and the blister, sand the outer surfaces of the blister and side cover with medium grit paper and apply a thin layer of body filler to smooth the transitions. Shape and sand the body filler to a smooth line. Repeat thin layers of body filler as needed to get the desired smooth transition line, then sand and prep for painting.
13. Prime and paint as desired.

Contact Information

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